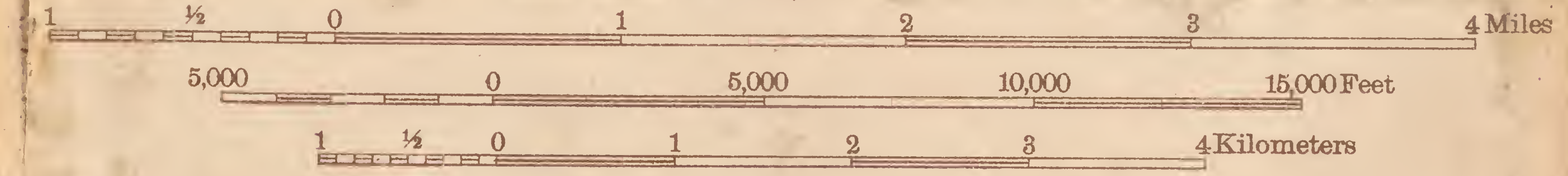
Macy

GEOLOGY FIELD BOOK

HARVARD COÖPERATIVE SOCIETY
Cambridge, Mass.

Scale $\frac{1}{48,000}$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4 Miles
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Contour interval 20 feet

Datum is mean sea level

½ Dev

O = ~~Mosh~~ Murfreesboro

M = Moccasin

T = Trenton.

F. = Fairview

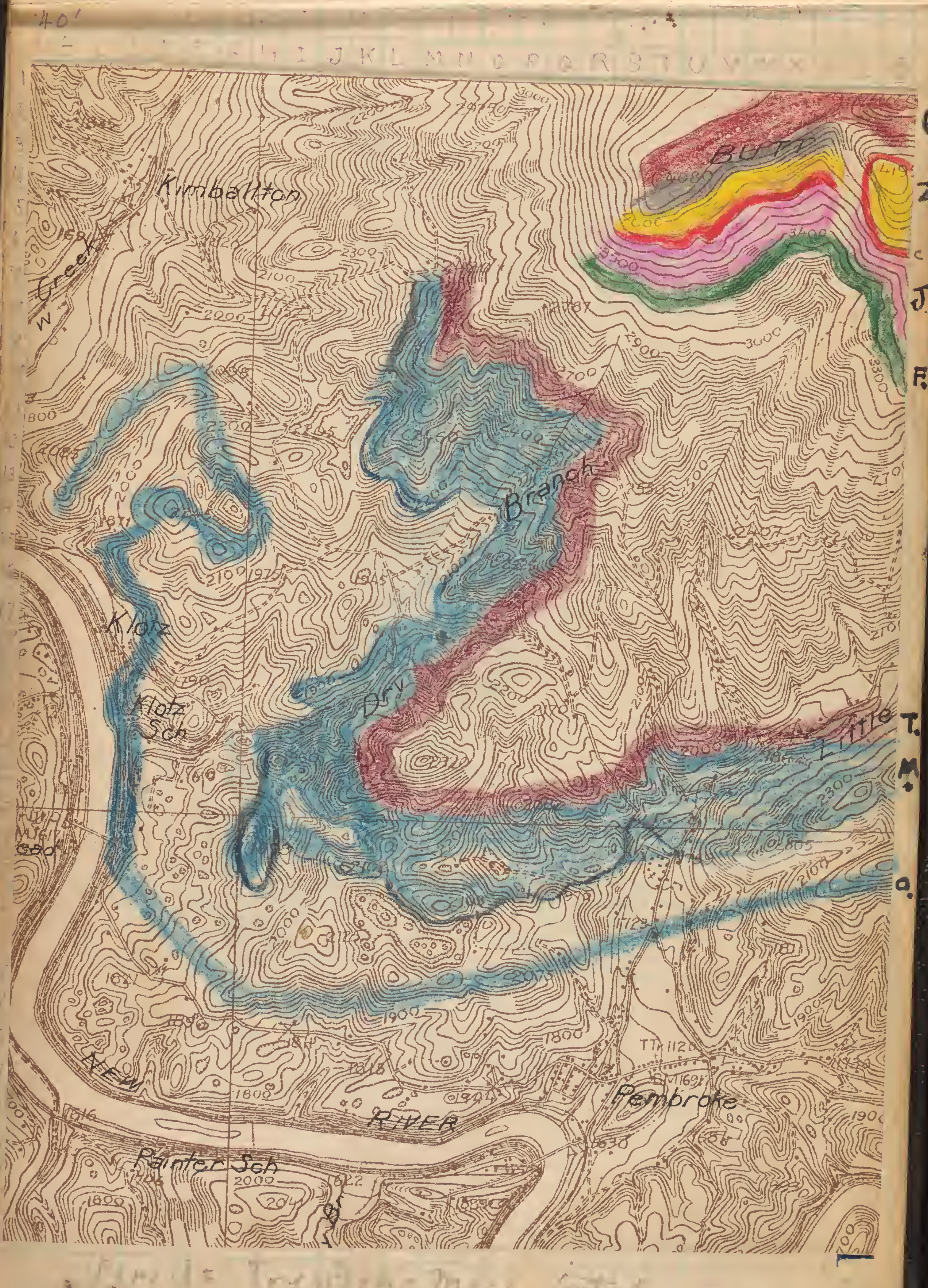
J = Juniata.

C = Clinch.

Z = Cacapon.

K = Keefer

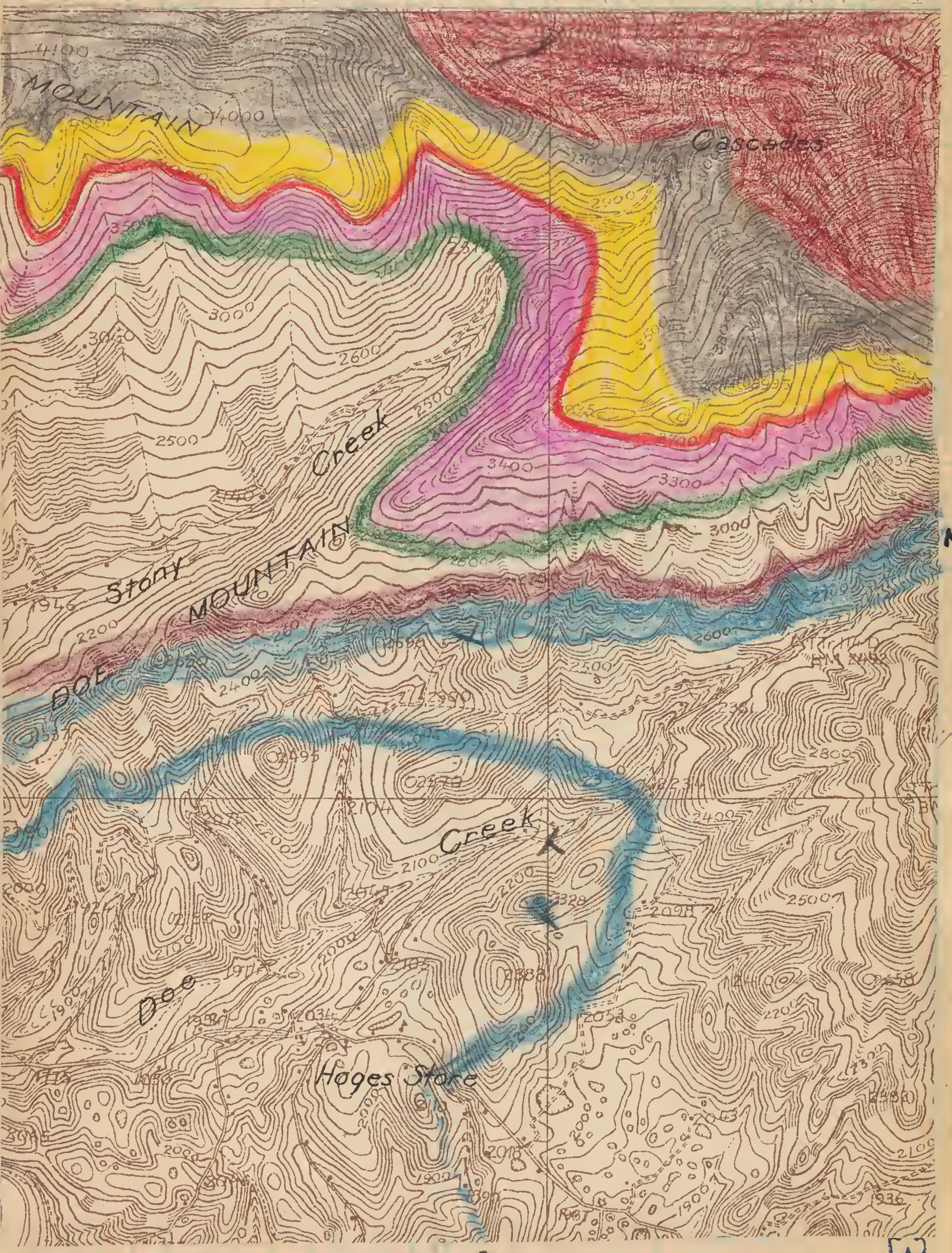
G. = Giles


40'
Kimballton
Creek
W.
BUTT
G.
Z.
C.
J.
F.
Branch
Klotz
Klotz Sch
Dry
Little
T.
M.
O.
NEW
RIVER
Pembroke
Painter Sch

[illegible]

▨ = K. (AT BUTT.)

35'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4000
Cascades
3000
2600
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Creek
3400
3300
Stony
DOE
MOUNTAIN
2200
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2600
2800
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2000
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M.
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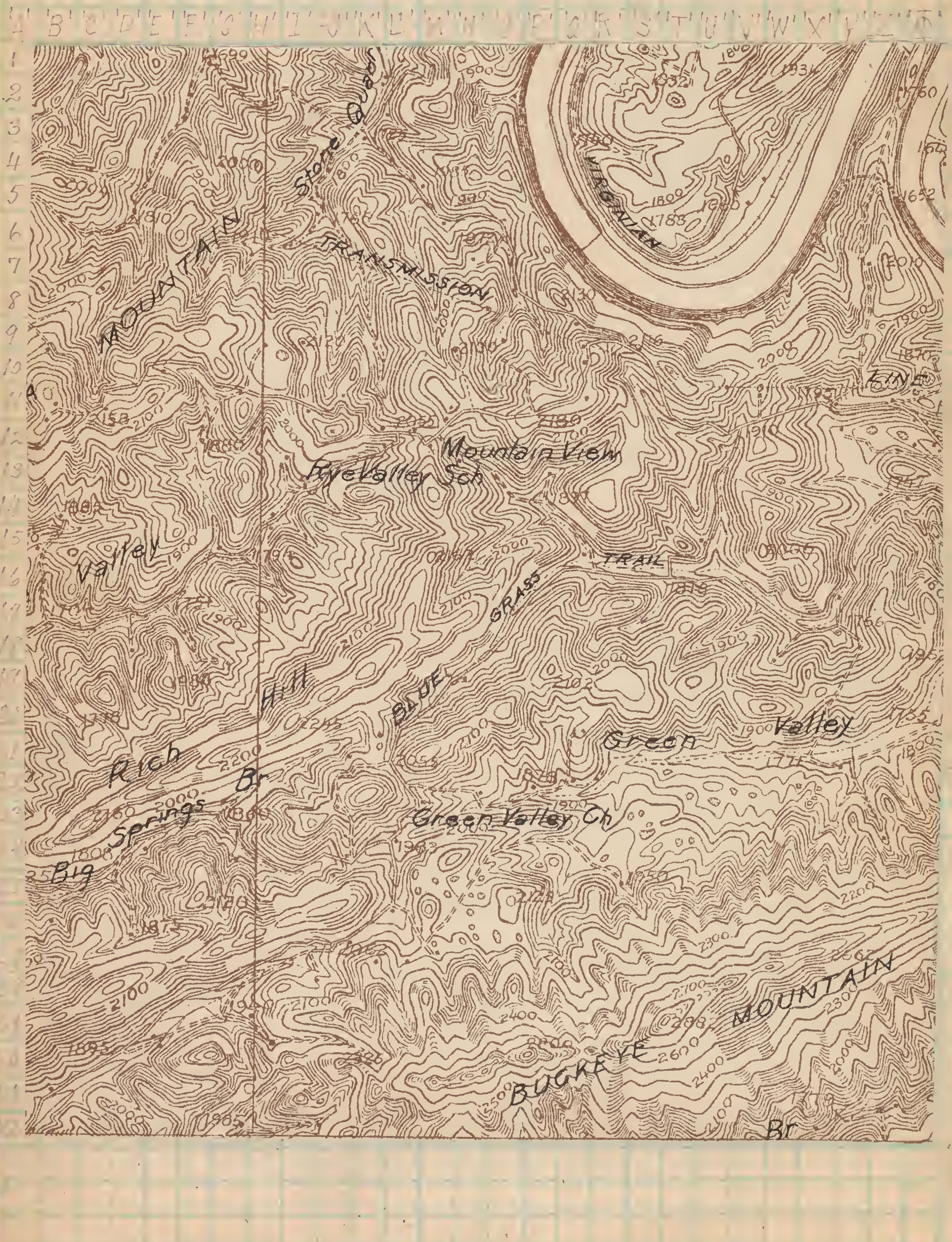
Shen-Chick Contact.

R
SAME

Wolf. & Chick.


A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
MOUNTAIN
Stone Quarry
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LINE
Mountain View
Rye Valley Sch
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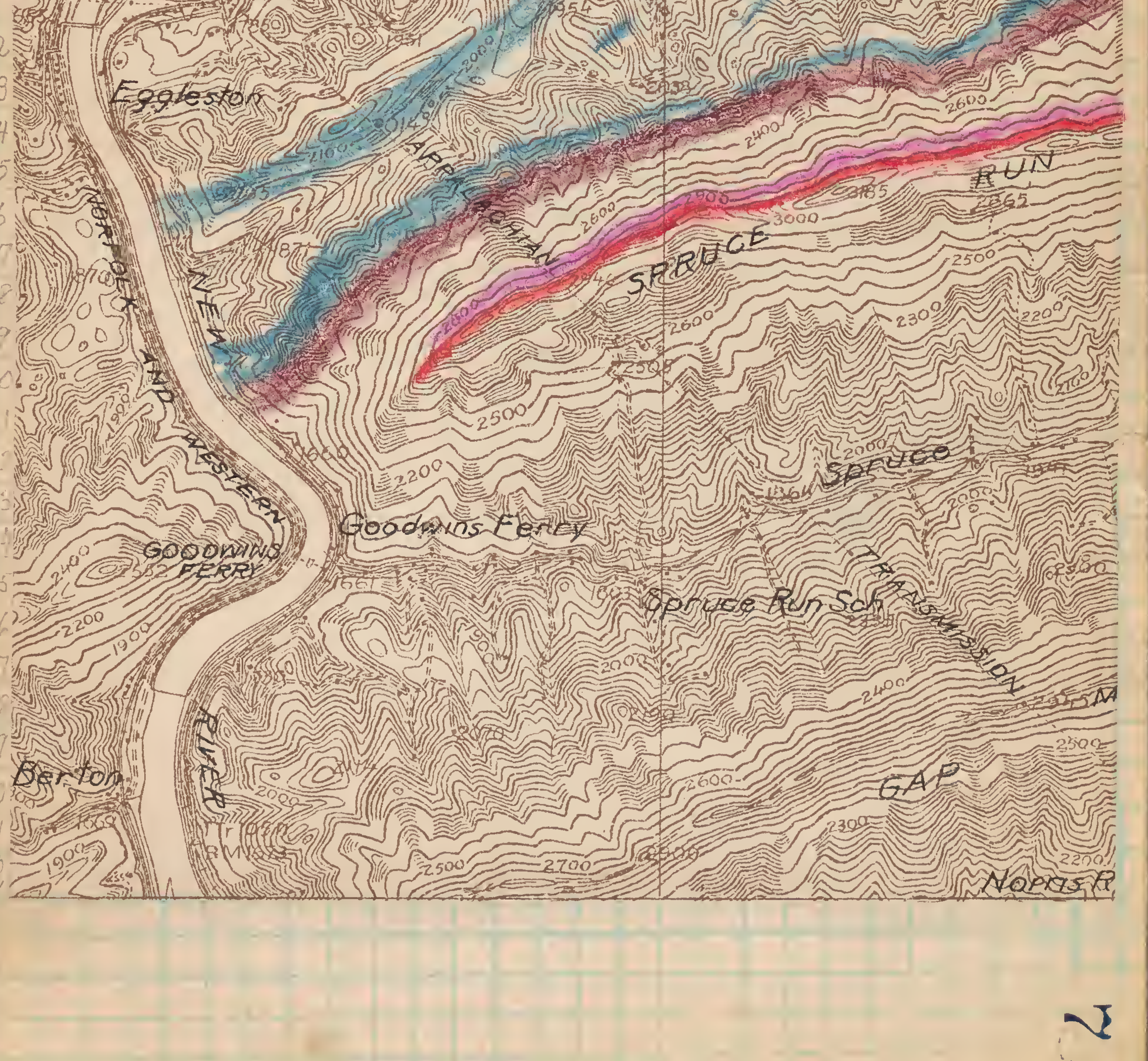
O


Zion Ch.
BLUE
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APPALACHIAN
SPRUCE
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NORFOLK AND WESTERN
NEW
RIVER
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GOODWINS FERRY
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TRANSMISSION
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2365
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June 28/32

The Physiography of
Little Stony Creek.

The physiography of this valley is involved and difficult to interpret. From the flats, starting just west of camp we find that it has all of the various types of erosion that one can find in old age and mature stream valleys, to the cascades where we find the young stage of stream erosion. This means that one can find the narrow, gorge, "V" type valley, the broader more dissected type of valley with medium sized alluvium and small and large boulders and float, and the broad, flat, alluvial terraces that are being disected by modern day streams, and the flats formed by the old river bed itself.

Just about at the camp itself there are alluvial fans coming down the side of the disected hills which were cut by the old stream. Here also we find sets of terraces formed by the old river. These today are being cut by small creeks, which on coming down the side of the hill on which these old terraces are cut, make a further disection which adds to the hillyness of this rolling topography of this valley.

As the stream is traced back to the cascades the strength of the stream increases and we find the size of the boulders and float increases in size. The valley itself becomes narrower than it has been and flats begin to decrease in width. The size of the terraces decrease and the slope of the bordering hills increase and takes on a more youthful appearence. Along the sides of these hills the surface water cuts narrow gullies by which it reaches the creek.

Here begin the escarpments we noticed. They are all on the south side of the creek and all of the present heavy alluvium is also on the south side of the valley where the present stream flows.

The terraces are of red shaley

limestones that are covered over by alluvium.

From the beginning of the escarpments the terraces stop. One of the most noticable outcrops along the escarpments on the south side of the creek is one the north side of Doe Mt.

Here the alluvium reaches a size that is at least 12' across.

From this point on the valley narrows and takes the appearance of a young valley or state of erosion. The float becomes much larger and are of the more resistant type of rock. The farther up-stream one goes the more youthful the valley appears. The water flows considerably faster

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to the vertical and have small talus slopes. Many show rocks that have slicken-side structure. The valley here is nearly a gorge or ravine, and the creek is about 400' below the road.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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Brooks

1909 –

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limestones that are covered over by alluvium.

From the beginning of the escarpments the terraces stop. One of the most noticable outcrops along the escarpments on the south side of the creek is on the north side of Doe Mt.

Here the alluvium reaches a size that is at least 12' across.

From this point on the valley narrows and takes the appearance of a young valley or state of erosion. The float becomes much larger and are of the more resistant type of rock. The farther up-stream one goes the more youthful the valley appears. The water flows considerably faster than it does down stream. The cascades are just above this point and are probably formed of a very resistant quartz conglomerate that forms a roof of a small cave across the stream. The walls of the valley here are close to the vertical and have small talus slopes. Many show rocks that have slicken-side structure. The valley here is nearly a gorge or ravine, and the creek is about 400' below the road.

June 29/32.

Weather: Clear, Sunny, warm.

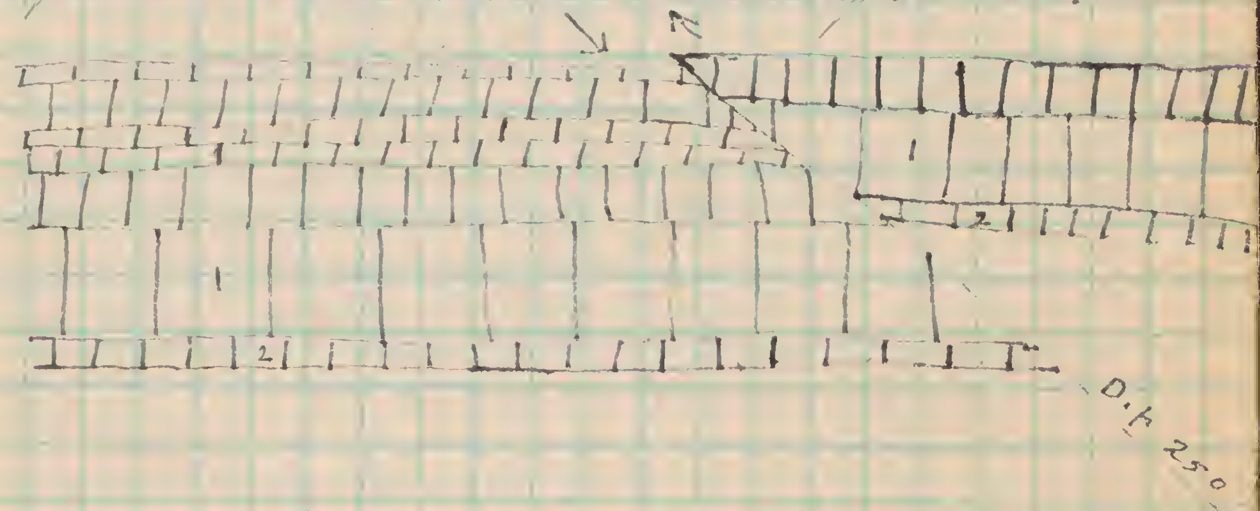
The Yoty Quarry:

About 200' high. Mostly level bedded and the same beds are traceable along the face of the quarry. The face is stretched out for ½ mile and all layers are distinct. In the face are weathered places and along these are clays and also small cavities or caves were probably developed and then the cave was destroyed by the explosions.

Along the bottom of the quarry toward Pembroke and parallel with the R.R. chert was found in quantity, but not noticeable in the quarry face. Also, in near the same place but more toward Pembroke was found a chert breccia showing an unconformaty, and a very good example.

Mined by churn drill and blasting powder, and air drill.

A fault is noted and is as follows.



June 30/32.

S.W. of camp and up the first road to the north. Beds of lime with fossils. Inter-bedded are layers of shaley lime. The limes are slightly crystaline. The predominate fossils are brachiopods of the Rafinesquina and Leptaena types. There were sandy layers also, but fossils were absent or scarce in these layers. The limes weathered lighter, rough, and angular. The fossils were in disorder and in seemingly definite bands of strata. One band was about 3½ inches thick and had countless fossils then another such layer was about 3 inches above and about the same thickness. The shaley lime inbetween was conspicuous by its lack of fossils. The rocks were grey and had calcite veining. Because it is not a competent group of rocks there are areas of slight slump. They dip N 80° E and the strike is N 10° W. They go about 60' in height, have a more massive bed of about 25'.

About 75' above is a reoccurence of a similar type of rock outcrop, and is probably the same formation. In this outcrop is a small shear. This occurs about 190' above the entrance to this road from the improved road. These beds weather in a more rounded an some have a cuboidal type of weathering.

About 200 ft above this outcrop is another outcrop of probably the same ~~outcrop~~ formation. It has a similar type of weathering and the same color and type of rock.

In P-12 there is an outcrop of red shaley limestone with a contact on a slightly sandy grey limestone; the contact is well exposed and occurs at a height of about 2340'. The grey sandy limestone forms a shelf of about 3' above the weathered out red shaley limestone and forms a miniature cave at the contact. The grey is over the red. The red shaley lime is traceable down hill for some distance. The grey limestone at the contact is slightly sandy. The red grades from a red to a yellowish shaley lime at the contact. The grey sandy stuff goes upward into a hard limestone with quartz pebbles. A sort of limestone with a quartz breccia. This weathers in differential layers, and dips slightly to the S.E.

It contains no fossils.

At M-12 about 2800' an outcrop of massive limestone with thin beds and interbedded shaley limestones. The massive limes underlie the thin beds. The massive stuff is varigated in green, grey, and red. It weathers round and rough. In places it also weathers rough and angular.

At K-10 the sink hole was probably formed by a cave that later collapsed and made the slump in the rocks. They now dip S.E but were probably horizontal before the slump occured. This is at an elevation of about 2835.

July 5/32.

Weather: slightly cloudy and breezy

At 'J-30 is an outcrop ~~a~~ of slightly variegated limestone of a grey color. There is a chert breccia in it and it has a little sand. There is also a bit of redish shaley lime and a little of red limestone. Irregular jointing and very little bedding. Mostly massive. It weathers to a lighter grey than the lime itself. The lime is a fine grained stuff and weathers angular.

There is an outer outcrop further down with a dip of 22° S.E. + Strike N65° E. This is a thin bedded lime with slight variegation in streaks of red. Then another outcrop of massive between this and the first. Along the road on the south side.

At 'N-31 there is an outcrop bedded lime that has thin and fairly thick beds. Some layers have small quantities of chert. The color is a grey and some layers are prettily variegated. Color varies from a grey to a dark blue. The rocks weather lighter and angular. Has calcite stringers in the joints. There is some clay in the bedding planes. On the north side of road. Dip 21° Strike N 74° E. It is about 50' long.

Near the end it has a good breccia in a sandy lime of a grey-tan color. Conchoidal fracture.

Above the road is an outcrop of red lime with breccia. This is about 30' thick.

Above N-31 is another outcrop of limestone that has calcite and pyrites. About 70' up the hill along the road further up is an outcrop of limestone with lots of chert in layers.

At 'S-35 there is an outcrop of massive lime which has a dip of 7° N.E and strike N 27° W. It has crinoids in abundance but only stems and it has corals, bryozoans, few brachiopods and gastropods. The outcrop is about 10' and has shaly and calcite stringers. The lime is grey and weathers in angular, rough, and differential and also lighter than the lime itself. It is hard and slightly crystaline. It is located on the south side of the road.

At 'W-4 there is an outcrop of limestone similar to the stuff found at 'S-35. The same crinoid stems and so forth. At 'V-3 the strike was N 40° E Dip 20° S.E. Probably the same formation.

We also found quartz crystals near here. Also trilobites

July 7/32.

Weather: Clear, sunny, warm.

At about P-32 there is an outcrop of sandy lime with some dolomite. It has chert in it and calcite. The stuff is grey and when it weathers has a rough sandy appearance, and lighter and some places has a tan appearence. The chert in places are in defined layers and in other places it is more of a breccia. It is probably the lower Shen.

The beds are of different thicknesses. Some are of 2' and others 6'. increasing.

It weathers angular, and it does not have regular joints

The joint planes get more regular as the bed goes higher. And small pieces of black chert mixed in with the white chert.

The joints are N 62 E & 10° W.
The strike of the beds is N. 83° E
The dip is 6° W.
This is all the Shenandoah.

There are small inclusions of chert then small local localities that have a different type of limestone that is fine and has small pieces of angular fragments sandwiched between two layers of the same sort of lime.

Between 32-L+M there is an outcrop of shaly lime that has a dark blue grey to reddish color and hard and partly crystaline. It scratches a hammer and is not a sandstone. It varies from 1" to 8". It weathers a greyish color and can see its bedding planes. This is between two layers of lime.

About 10' above this is an outcrop of lens of chert, white that goes along for a good distance and finally goes below the surface with the dip. It varies from a foot to a few inches

About 400' below the last inscript is an outcrop of honeycombed calcite.

There is also a layer of colored or varigated (calcite) with red + yellow veins. This is at K-32 and is about 8" thick. There is also a cave and the rock above is a resistant limestone and the weathered out portion is the soft colored (calcite). The rock below is the same type lime as the roof. The red on the (calcite ~ dolomite) is probably iron.

July 12/32

At 'N-31 an outcrop occurs with a chert breccia which is probably the base of the Chickamauga. This overlaps the typical blue colored limestones of the Shenandoah. The strike is N. 74° E. and dip 12° S.E. The breccia is about 3½' thick.

Just around the bend in the road up is another outcrop of badly weathered Chic.?

that has deteriorated into a redish clayish texture of rock. It still retains part of the bedding and jointing of the normal rock. This is about 125' above the first mentioned breccia. North side of road.

Around 'O'-6 there are brachiopods in abundance, but mostly fragmentary on splitting the rock. They were in no definite order. The rock is dove grey colored with much chert, and weathers lighter and shows bedding, but very little jointing; the bedding planes are irregular and these are the chert beds. The rock is finely crystaline and forms an escarpment on the east. The fossils are mostly imbedded in the chert. The strike is N. 30° E. and dip 25° S.E. The formation is from 80'-100' thick.

At 'P'-7 the beds are massive with bands of black chert close together. A few of these beds are thin bedded. The chert bands vary in thickness from ½" up.

On Spruce Run Mt. at 'Q'-16 is an outcrop of a conglomerate sandstone. This is probably the Clinch. There is about 100' of this outcrop. The strike is N. 70° E. and dip 42° S.E. On top the strike varied to N. 80° E and dip 45° S.E. This is a hematitic sandstone.

'S'-16 there is an outcrop of probably Cacapon. This has clay galls and impressions on it. This same formation forms a hogback over the ridge of the hill and it has its strike facing N.

At ('X'-10) there is an outcrop of limestone with bryozoans. This is not probably the Chic but one just above the moccasin (Trenton?) 2240

At 'X'-9 there is an outcrop of red limestone, Moccasin, ~~at a height of [illegible]~~ The strike is N. 70° E. and dip 33° S.E.

July 13/32.

There is a "plucking" of large boulders or fracture pieces by the falls. This leaves a sharp edge on the remaining piece of rock that had a piece at the fracture washed away. The bottom or floor that is on the basin of the falls is of a red hematitic sandstone.

There is a queer structure. The falls fall on ledges that protrude beyond the side walls. The side walls should be beyond the fall ledges. It is possible that the water cements the ledge making it harder than the side walls.

The falls were once probably to the end of the basin

The basin is probably of Clynton formation.

The Clinch is below this formation and forms rapids below in the stream. This has an angle of 35° and dips below as it nears the falls. The seepage is slow acting compared to the power of the stream and falls.

The falls belong in the last cycle of erosion no matter how many cycles there were before.

Probably it began at the "Beech Ford" further down in the valley.

There is a fault in which the lines (a) on the N. of the layers that under lie the falls are thrust over on the red hematitic sandstones. These sands under lie the falls.

(a) These are a type of shales and are arenacious. A little quartzitic.

There are minor faults and foldings that are intersecting with each other. The faults are thrust into each other and in some cases honeycombed.

The shales are Cacapon.

The second falls is about 1/8 mile above the lower falls. It has much the same dip and strike. The formation is different and the falls have a different aspect. The rocks protrude more and rest on the Clinton. The ~~Cafor~~ Cacapon is the lower Clinton. There are more small sections to the falls and the rocks are larger and more sandy.

The Oiles formation begins at the end of the cascades. It ~~contains~~ is Devonian and has 5 divisions and conforms with the Devonian of N.Y.

The Oiles contains manganese, but in small quantities.

(a) The falls has a fault of N35°, but this varies because of the curved surface.

July 14/32

The rock along the Va. R.R. ~~at the~~ station in Pembroke is probably the Shen. and it contains silica in a good many beds. It is mostly massive stuff that has a weathered appearance of thin beds. It dips to the river and the strike is to the Pembroke Quarry, and it goes below the rocks in this quarry. Refer to July 1/32

At "R-5 there is an outcrop of siliceous lime and dolomitic lime. This is probably part of the lower Shen. The rock itself varies from a dark greyish blue lime through to a light grey and then to a tannish dolomitic color. It weathers in honeycombed fashion and it brings out the Oolites in the concentric layers. It also weathers darker.

It is about 18' thick and has slight variations of the same beds in structure and composition that is local. It is darker in spots and the weathering varies a little. The beds are marked fairly well and the jointing is fairly marked. Some layers have mica veins in it.

Strike is N. 85°E and dip 10° N.W.

Just below this is a layer of shaly dolomitic limestone about 7" thick and then a layer of dolomitic limestone slightly siliceous. In this layer is a group of Brachs? and a trilobite? All of this is still Shen. Lower.

At 35-Y1 there is an outcrop of purplish to pinkish sandstone. This layer is about 10" thick and very quartzitic. It weathers a redish color and has an angular fracture. It is the mark of a ~~ma~~ horizon and is sandwitched between 2 beds of sandy dolomitic limestone. There are thin beds of the same type of sand as the 10" in.

The whole Shen. varies from one formation to another. It goes from a lithographic to a course crystaline lime and then to a sand stone. At 34-Z there is an outcrop of a fine grained light grey limestone just about lithographic. The joints were very regular and sharp and made a good show with the bedding planes. The strike of the joint planes were N75°.

All of the rock in this place are well bedded and show distinctly. The hight of the bluff is from 100'-300' approx. Nearly all of the bedding planes are in the ~~sto~~ same dip.

There is much chert, mostly black and very very few, if any, fossils. The chert in some cases has a calcite veining through it. There is also an abundance of calcite.

The lime have a habit of varying in color and some of the rock is banded and has an appearance similar to thick shale beds.

The calcite occurs in veins and sometimes in small nodules or cavities. Some comes out in comb-in-comb structure in the bedding plane.

The chert is in layers and nodules.

The hard layers also project beyond the softer stuff and form small ledges on the face of the cliff.

At 34-L the strike is N 60°E and the dip is 10° NW.

July 15/32

At Narrows.

July 16/32

At R-24 there is an outcrop of "moccasin" that is about 4 ft in the [illegible]. The rock is reddish with calcite veins. Then a small ledge formation and then a grey green layer or layers with calcite veins and small calcite crystals. The rock is harder at the bottom and retreats into the hill as it goes up even though the dip is almost horizontal.

There is a sink hole below and this is probably the cover of the sink-hole formation that is probably Chickamauga. This cover of Moccasin is fractured many times and has been re-cemented by calcite. There are some that have been cemented by clay also. This is probably an incompetent layer.

At 24-P there is a strike N 80° W & dip is 14½°. This is on the north side of the road, and about 25' above bridge on road.

At P-25 there is an outcrop of moccasin that is quarried for use as "red marble".

It has mud cracks and all typical moccasin character. It is on the south side of the road and just level with the center of a corn field. It has a strike of N 50° W & dip of 8° NE. All of the mud cracks are calcite filled and the rock has a habit of slight variation in color from red to green grey.

It is about 20' of outcrop. The young weathered surface is slightly variegated. The older is a dark to light grey with small ledges and concave formation.

Probably the same horizon as R-24.

Some mud cracks have clay in them as well as calcite.

M-24 there is a strike N 80° W & Dip of 11° NE. and the same rock horizons.

M-N-25 there is an outcrop of moccasin and below it is Chickamauga float? There are all of the fossils of the Chic. and some gastropods that were not mentioned. The contact line is just above the sink hole line at bottom of valley which is anticlinal structure.

The dip of the Moccasin is 12° SE. and the strike N 40° W.

There are small terraces where the sinking did not finish up completely.

The jointing of the moccasin in some layers near the top makes rhombs with the bedding planes.

The ~~b~~ line is partly hidden and the contact also is hidden.

At M-24 the moccasin strikes N 70° W and the dip N 10° E

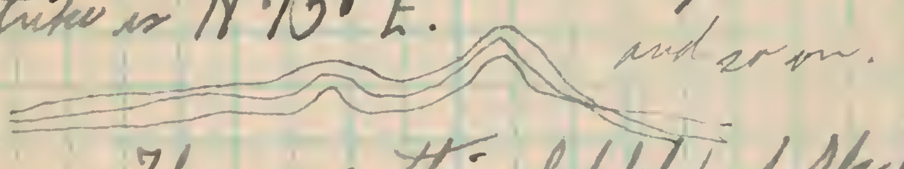
At about 23-K there is an outcrop of Moccasin with a strike N 55°E and dip 14° S.E or N.W. It is probably lower moccasin and it outcrops all along side of north bank of hill. There is a fossil horizon in one of the moccasin horizons but cannot tell just how high or low. It contains brachs, bryozoans,

There is an outcrop of Chica. that is probably the upper Chic. This is at G-21. The strike is N 80°E and the dip is 16°S.E.

At I-16 the dip is 16°SE & the strike N 40°E.
At L-15 " " " 12°S.E. " " " 20°E
and there is much chert in layers and nodules, much calcite veining and crystals. The rock is dark bluish grey. There are many fossils and mostly brachs. and bryozoa. Some gastropods & few corals were seen

At about R-10-11 there is an outcrop of probable Trenton? There are many fossils and they are mostly brachs, bryozoans and perhaps pelecipods? Most of this is float. There are also gastropods.

At T-16 there is a small creek that has a series of incompetent beds. There are two minor folds of about 15' of traceable strata. This is probably a series of the Trenton. The strike is N 75° E.


and so on.

They are thin bedded, dark blue, fine, almost lithographic texture limestone.

The outcrops are at the E. side of the creek. It weathers a greenish color due to the moss and moist growth.

July 22/32

This is in wrong chronological order.

At 'B'-4 there is an outcrop of Shen. in the dry bed of Sinking Creek. It dips 14° N.W. and N 65°E strike. There is a conglomerate layer. The pebbles are quite large, and flat. The matrix is a medium fine crystaline limestone. This is probably one of the lower members of the Shen. Lower than the syllabus. Most of the pebbles have a redish tinge and are not as coarse as the matrix.

Weathers into beds and few jointing planes. Some weathers quite massive. Has a dirty brown color. Some calcite is distributed throughout the rock and the fresh rock has a blue grey color with a slight redish tinge.

There is an outcrop of Shen at the stream bed itself. The dip 23° S.E & strike N 20 E. About 'C'-4 this bed is located. It is a dense bluish fine grained slightly crystaline lime. The rock weathers lighter and shows semblance of jointing. Has calcite stringers or veins. No chert. Shows bedding planes when ~~without~~ weathered. The dip side is facing the flow of the stream. Has a set of rhombic fracture or cleavage.

At 'D'-4 there is a large piece of float close to its place of origin that is cross bedded. Some at high angles. Some of the grains of this calcareous sandstone has parts that are frosted. Mostly cross bedding. It varies from a blue grey to a tanish grey in color. When weathered it takes on a fluted appearance.

About ½ distance up the face of quarry oolites were found in abundance in a horizon of this outcrop which is of Shen. This varies from a sand up to a fine at the top. The bedding planes are shown by weathering. The rock splits ~~up~~ into uneven blocks. The rock the oolites are in is silicious and dark.

At 'D'-5 the strike is N 26° E & dip dip 8° S.E. This is at the far end of the quarry. There are cave formations and the quarry pitches out. There is chert here and it is nodules and layers. The fragments on the ground show high contortions and chert in it also show banding in a contorted manner. The chert is black and the limestone greyish. It is fine grained, slightly rough on feeling and non-crystaline and possibly dolomitic. There is an abundance of oolites in lime & chert.

At 'F'-4 there is an outcrop of med. grey limestone. Strike N 85° E & dip 13 S.E. There are calcite nodules and stringers. The rock is fine grained and (slightly) crystaline - jointed.

July 20/32

At the track over Doe at the bridge where there is an outcrop of red mud-cracked moccasin. The strike is N 60° W - Dip 6½° N.E; At U-21.
At W-22 there is an outcrop of grey moccasin. N 50° E - Dip 11° N.W.

At B'-28 there is an outcrop of Chim? with a strike of N 43° E + Dip 28° N.W. There are greenish and brownish veins and spots through the rock.

There is an outcrop of moccasin that has a coarse crystaline layer with calcite in spots in between two fine layers of moccasin. The top layer is reddish & bottom is greyish. The crystaline layer is about 9" thick and is variegated slightly.

July 25/32

Strike N68°E at the completion of curve of the R.R. east of Eggleston. Dip 28° S.E. The outcrop is at 'C'-14. This is probably Shen. The rock is typical of this formation. Layers of chert and fine to coarse lime. Dove grey to blue grey and weathers light grey and into bedding planes.

About 500' further there is an outcrop of rock that has an outcrop of chert in layers and nodules. This is at about 16-'C'. This horizon is probably one of the Chica. The chert is black and the lime is darker than the outcrop of Shen. There are calcite stringers throughout. Strike N55°E dip 40° S.E. The contact is between these two formations. Poor jointing. Hackly fracture.

About 30' down the tracks there is another outcrop of rock that has fair jointing ~~and~~ on face and good jointing across the perpendicular to the face. The bedding is apparent. Perhaps another horizon of the Chica. Partly massive and some medium bedded. Weathers light. Strike N70°E dip 34°S.E. Little or no chert at bottom and up to the top which has a layer that is full of chert in nodular layers.

At about 18-19-'C' there is an outcrop of divided Mosheim. Strike N55E Dip 55°S.E. This has girvanella. It is a greyish medium bedded lime. Weathers near same color. Mosheim.

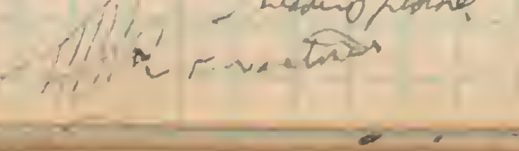
Further up the R.R. about 40' the Strike is N62°E. Dip 62° SE.

At 21-'E' there is an outcrop of Moccasin the contact is partially hidden.

At 21-'D' there is an outcrop of Moccasin & Trenton at a bluff from the R.R.

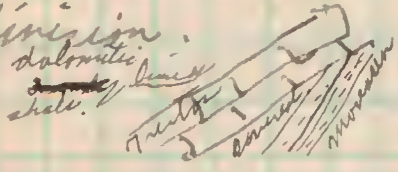
The contact was covered but the two were present. Resembles Moccasin.

The Moccasin at 21-'D'-'E' is developing a slaty cleavage at an angle to the bedding plane.



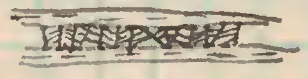
This is due to pressure and shearing of the strata due to contortion of the movement of the beds. The cleavage is fracture Cleavage.

There is also a contact with Trenton here on the railroad tracks also. It is a sharp division.



The Trenton also has the slaty shaly fracture at ase angle to the bed.

Probably more 51% moc. here than Narrows. Less lithographic, more fracturing, slightly convex form structure here and these are between two layers that are not



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The Trenton & Chick. are about the same The Strike N 78°E. Dip 48 S.E. at contact of Trenton - Moccasin.

At 24-G' there is an outcrop of Pre-Shen. Probably Nolichoky shales or the Rome Shales. This is much lower than the Shen. at Narrows. This follows the upper Ord. a fault somewhere between. Dip is fairly consistant

At D'-28 there is an outcrop of probably Nolichucky shales. These contain phosphatic brachs? This is a banded rock that is wavy and the bands divide into several. The rock itself is a greyish with the bands making it darker & lighter. It a resistant rock and a ripple maker in the stream The brachs are abundant and seem concentrated in some layers more so than in others. Probably Lingula types

The fracture of the rock is uneven but the bedding planes are fairly apparent when weathered. The Strike N 65°E + dip 55°SE.

About a mile from the coal mine on the N.&W. R.R. towards Barton, are rocks that contain "Zaphrentis", crinoids, "productus"

Below Barton towards the mine by Gap

Mt. (Opposite). are three distinct horizons of the Chick. This is diff. from Narrows. Helps the Basin & Deposition theory. Strike N 65°E Dip 65 S.E.

July 26/32.

The contact of Chick + Shen at M'-31 is Strike N 67 E Dip 28 S.E. Conglomerate.

At 26-P' there is a contact of Chick & Shen. Strike N 39 W Dip 2° N.E.

At N'-22 there is an outcrop of Chick capping the hill. The rock appears to dip NW about 15°. The strike is to the NE about 63°. The rock is blue grey Chick with calcite veins.

At N'-18 there is a contact of Chick and Moccasin. Strike NW Dip NE.

At 22-O' there are Shen & Chick within 5' of each other. Strike around NE & dip N.W.

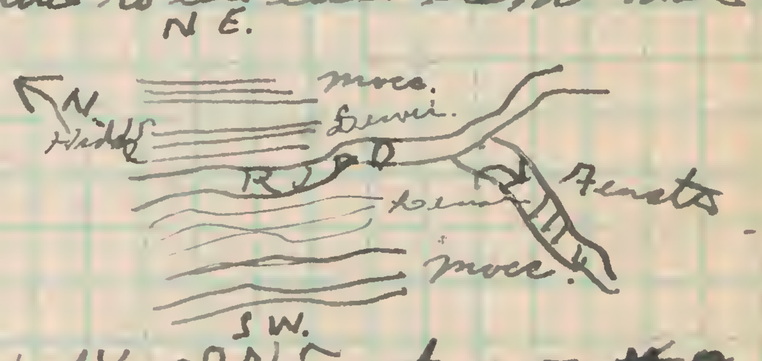
At P'-Q'-24 an outcrop of Chick-Shen with a NE Strike & S.E dip.

Following up the road we came to a predominance of Chick - The Shen is between 24-R' & 24-Q'

July 27/32

At T-23 there is a contact of Lenoir and moccasin. At 23-T there is an outcrop of Moccasin with a strike of N 35°W and dip 12° N.E.

At 25-P there is a contact of Lenoir and Moccasin. This is on the south side of the road and westward. Then on the north side of road a little to the east is another contact. (vz)



The strike is N 65°W & dip 9°NE. at 25-~~N~~O-P

There is a small "Fenster" in the ravine to the east of the quarry. This is of upper Lenoir and it has a bearing on the contact of this and the Lenoir. It is about 100' below the quarry and 100' off of the road to the south.

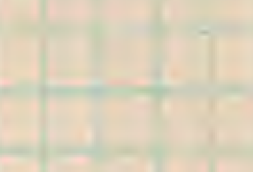
Just back of the house in the sink hole there are several little windows of Lenoir through the moccasin. These are little anticlines that raise them up. The Moccasin dips south & the Lenoir dips north, not big enough to map.

At 25-N another contact with Lenoir and Mocc. Strike N 51°W dip 9°NE

July 28/32

At 23-I-J there is the continuation of the same Lenoir-Mocc. contact. This fluctuates along the path, mostly above. At 23-J there is a contact readily recognizable the Mocc. lies on the higher above the path.

At 22-I the contact forms a saddle of moccasin at the saddle top and in the sides of the sink holes the Lenoir is outcropping. This gives a round ring of contact around the large sink hole and a hidden one in the small little sink.



The beds have a small dip to the N and are fairly horizontal.

At 25-K the dip on Mocc-Lenoir contact is N 80°E strike and dip is 7°NW. This is on south flank of 2103. Here the Mocc. just caps the hill and below it is Lenoir.

At 23-G the dip changes to 21° ~~NW~~ S.E. and the strike N 77°E. This mocc. and it forms a series of low hog backs along the crest of this low hill.

At 20-J there is an outcrop in a ravine that was at one time probably a spring. The rocks are well exposed and are mocc. There is a contact with the Lenoir at a distance not greater than 20' away. This runs into Dry branch. The strike is north east or to that general direction. The dip is to the southeast and goes into the hill

At L-17 there is an outcrop Mocc.-Lenoir in the banks of Dry Branch. There are some of the top few layers of the Lenoir that are fracture jointed and are changed to chert. There is a covered interval in which the contact is. About 10'. They strike ~~N~~ ~~NW~~ N 65°E and dip to the ~~SE~~? S.E. 10°

At M-14 there is an outcrop Mocc and Chick. They are covered at the contact

str. NE?
dip N.W.?

At 14-N there is a well exposed contact. On the side facing Butt the strike is N.W.? a general direction and the dip is to the N.E.?

E

July 29/32.

At P-17 there is an outcrop of Lenoir, probably lower Trenton. The beds are badly contorted and show beautiful examples of fracture jointing. There are many little folds and several minor shears and faults. The thin shales are fracture jointed and the thin lime beds are block faulted. This is at an altitude of 2065 The beds are very incompetent.

At 17-N-O there is a contact of Mocc-Trenton. There is a weathered sandy horizon in the Trenton just above the contact. This resembles a dolomite. The Mocc at contact is the red shoe-peg weathering type. Strike N70°E dip 18°S E.

At L-M-13 there is an outcrop of Lenoir-Mocc. ~~that~~ contact. In the Mocc. there is a good deal of fracture jointing in the lower horizons+

At K-12-13 the contact between Chick-Mocc. is hidden but the point of contact is within a few feet under the float. Strike N15°E dip 10°S.E.

At 9-~~J~~ K there is a contact of Mocc-Trenton. At the contact the Mocc. is red. (It has ~~a~~ N ~~E~~ 31° strike and a dip to the S.E. 15°) The dip of ~~it~~ 9° N.E. Strike N50°W

August 1/32.

At 'Y'-14 the Cacapon forms a hog-back across the crest of Spruce Run Mt. The Dip 58° S & strike ~~is~~ E.W. From here the Cacapon goes away to the wooded surface and gives Clinch along path. Then at the small rise there is Cacapon again

At 'S'-15 the strike ~~dip~~ on the Cacapon is N75°E the dip 38° S E

At 'N'-16-17 there is an ~~contact~~ ~~#~~ outcrop of Clinch that has ledges and caps for the escarpment face. This sandstone has a large ledge that has turned completely to a quartzite, not a quartzitic sandstone. This is glassy and slightly varying and a flint like fracture. The stone has minor fractures and the main bedding plain is well preserved.

~~Ju~~ August 3/32.

At about T'-3-2 there is an outcrop of Giles. The contact is hidden but it is within 40' of the certain Keefer beds. The dip is to the N.W.? and strike to the N.E.? The beds are massive with bedding planes showing up only on weathering. The rock is light stained with iron. It is siliceous and has a fairly coarse grained [illegible]. The outside turns white when weathered and it is irregularly jointed. It is a resistant stone making bluff faces and ledges.

On the road just parallel with the upper falls there is a "slippery" phase of the red of the Giles formation. It has cracks + oriented stems and powder on a blow. It looks resistant but is not. It is on T'-V'-2. Looks like the other Giles before blow is struck. This weathers buff color. The [illegible] is poor or absent. It is white and powdery.

At T-3-4 the Giles is dipping to the N.E. 19° and strikes N.W. It is the white Giles [illegible] impregnated with iron.

At R'-Q'-2-3 there are outcrops of red Giles this is a well cemented iron stained and impregnated sandstone. This forms small ledges and shows good bedding little or no jointing. It dips to the N.E. + strikes to the N.W.? There was no good place to strike good dip and strike. 15' above this is white Giles again. The red is perhaps only a short phase of the white Giles. Above this is a great covered interval on which there is float. Mostly white a little red and some white with [illegible] in it. This is at R'-2.-S'-1-2. In this area there is little that ~~is~~ can be made sure of as to being really in place.

At P'-2 there is a large ledge of red + white Giles. The red has hematite and limonite in the bedding planes, and the bedding planes are well shown. They range from 1" to 1'6" and are well cemented. The joint planes are slightly rounded and are fairly regular. There is much slump ~~in~~ these beds. Large fragments have fallen off recently, and form a talus down to the road. The strike is N.W.-S.E. + dip N.E.?

At O'-5 there is variegated Giles the most of the which color is near the outside some of the stringers go into the rock also. It looks like the same horizon as the two diff colored forms at R'-Q'-2-3.

August 4/32

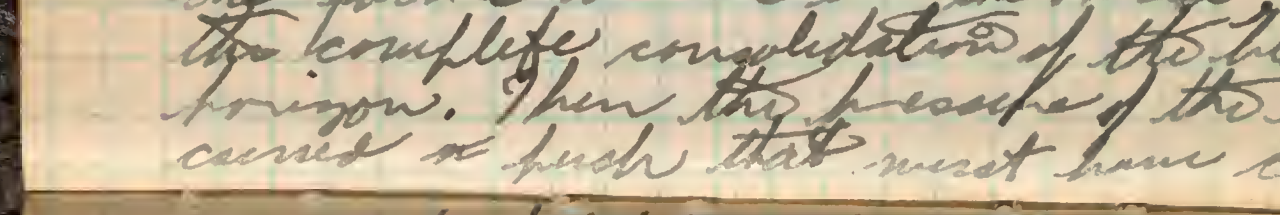
At 20-W there are many flexures and minor folds that have a [illegible] hump structure. The fold goes to a peak and slants away in all directions. The rock is not a resistant rock to pressure or weathering. The thin shaly beds are in reality limes that have very very thin bedding planes and these were pressed together so tight they consolidated to a certain degree. The pressure and folding made fracture jointing go into this thin amalgamated beds. Thus the shale is really a lime that did not deposit in customary manner. There are other layers of lime that are thin but are really limestone layer rocks. These are mostly jointed in regular cubical figures but the ends weather to a lance head form and then this carries back to make the completely weathered piece an elongated arrow shaped rock.

The places where the folds are greatest, the limes are thinnest and really not cracked as much as the places where it is only slightly folded. This was probably due to local conditions and type of pressure. There are a few small shears. These show the real flexibility of the thin beds and the type of pressure.

Some of the folding perhaps came before complete consolidation of the beds. There is quite a bit of folding down near the bottom of the Trenton but less as it goes up. Perhaps some of the small concave ⌒ formations were due to a small accumulation of gases from the fauna buried in the mud, before the complete consolidation of the beds & horizon. Then the pressure of the east caused a push that must have caused a real folding but was prevented at the top by the unfoldable beds above it and the ones beneath it. Thus at the bottom the only direction was up and the beds above in the Trenton took this pressure in a slight thinning because of their younger age.

A good bryozoan? was found here and it was in the "shaly" layers.

At T-16 there is another outcrop of probable Trenton beds. These are convoluted and folded into 2 small anticlines in 12'. They are limes and have the same sort of fracture jointing in the folded part. The heavier lime layers are not jointed into such cubical blocks as before. They weather diff. also but they have the same characteristic flexibility as the beds at 20-W. In the crushed or folded area the cubical jointing is noticeable only.



x = An open space in the beds; this marks the division of the highly convoluted rocks below and the straightening layers on top

Z. The rocks dip down here and go out of sight. Do not return in the creek valley.

O. This is the highly convoluted rock dome that is first seen above the surface of the stream. It is about 3' above the water and about 5' from start to end.

The rocks above this are straightening out and are not as thin at the edges of the folds as the lower ones. At the top there is very little thinning.

At Y-20 the Trenton crops out in the road and along the sides. The layers strike N63°E & dip 20° NW. They do not seem convoluted but are undoubtedly folded to a good degree.

Some layers are very ~~fos~~ fossiliferous.

25' down towards camp one notices a degree of convolution again. This is probably going into the lower, and the unconsolidated rock of the fore mentioned.

MAP #4

V-3	N 40° E	20° S.E.
I-3	N 40° E	23° N.W. ?
G-3-4	N 18° E	10° S.E
H-4	N 20° E	12° S.E.
K-9	N 40° E	12° S.E.
M-11	N 26° E	29° S.E
P-7	N 30° E	25° S.E
Q-16	N 70° E	42° S.E.
S-16	N 86° E	46° S.E.
Y-9	N 70° E	33° S.E.
A-7	N 70° E	10° S.E.
Φ-8	N 90° E	20° S ?
Φ-9	N 80° E	29° S.E. ?
Φ-10	N 65° E	57° S.E ?
D-16-17	N 80° E	36° S.E.
F-G-14	N 70° E	26° S.E.
N-11	N 36° E	27° S.E.
N-15-16	N 70° E	28° S.E
D-18	N 70° E	34° S.E.
D-19	N 66° E	47° S.E.
E-21	N 85° E	50° S.E.
D-28	N 65° E	55° S.E.
S-T-11	N 90° E	50° S ?
M-15	N 68° E	69° S.E.
I-24	N 68° E	65° S.E
J-20	N 65° E	86 S.E.
J-22	N 52° E	66 NW

MAP #3.

0-1 (R.R. Track) N55°E 16°NW

MAP #2

R-8-4	N 3°W	17° N.E,
R-6	N 35°E	19° S.E.
A-30	N 10° W	5° S.W.
D-31	N 120E	5° S.E.
O-24	N 30 E	10° S.E.
W-19	N 5°E	11° S.E.
L-30	N 65°E	22°S.E.
T-2	N 20'E	5° S.E.
J-30	N 65°E	10° S.E.
K-35	N 70°E.	12° N.W.
N-31	N 74°E	12° S.E.
B-21	N 65°E	22° N.W.
L-14	N 60°E	22° N.W.
O-6	N 15°E	10° S.E.
N-5	N 10°W	12°NE
J-K-6-7	N 30°E	5° SE ?

Map 1.

N - 17	N 45°E	20° S.E.
V - 31	N 65°E	140 N.W.
W - 30	N 60°E	11° N.W.
A - 28	N 76°E	140 N.W
S - 5	N 40°W	40 N.E.
P - 24	N 80°W	15° N.E.
P - 25	N 50°W	8° N.E.
N - 24	N 80°W	11° N.E.
M-N-25	N 40°W	12° N.E.
O - 24	N 70°W	10° N.E.
J - 23	N 90°E	7° N ?
H - 21	N 75°E	15° S.E.
G - 21	N 80°E	16° S.E.
I - 16	N 40°E	15° S.E.
L - 15	N 20°E	12° S.E.
M - 13	N 30°E	11° S.E.
N-25-26	N 70°W	16° N.E.
M-N-27	N 70°W	16° N.E.
W - 30	N 60°E	18° N.W.
X - 23	N 65°E	25° N.W.
Φ - 22	N 35°E	26° N.W.
V - 21	N 78°E	14° N.W.
Q - 23	N 70°E	9 N.W.
O-P-17	N 60°E	22 S.E.
S-5	N 40°W	9° N.E.
U-5	N 47°W	10° N.E.
U-V-5-6	N 70°E	43° N.W.
W-5	N 80°E	40° N.W.
Y-4	N 80°E	70° N.W.
Z-4	N 35°E	6° S.E.

K-2 Up about 20' from bottom.

K-3 In the middle of the Keeper.

K-4 About 20' from the top of the Keeper.

K-5 At the top of the Keeper.

Z-1 is from the lower Cambrian along the Eggleston - Parrott. N+W-R.R.

Y-1 + Y-2 are from the Chick near Zion Church.

X-1 is from the Shen. Oolitic.

W-1 is from Bloty's quarry.

V-1-2-3 are from the Miss. beds at Parrott.

T-16 is from the Trenton beds.

U-1 is from the Chick. beds.

S-1-6 is from the Giles at the Cascadent up on the hill above the Cascades.

T" at the conspicuous Trenton beds of the creek from camp.

P-1-2-3 The beds of T"

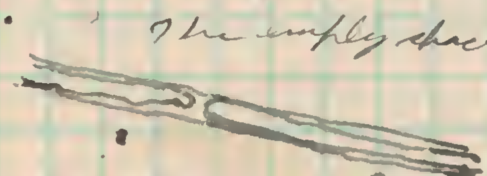
C-1 From top or bottom? of the Cacapon. Clay blisters on one side.

C-2 Also Cacapon. Not so rough grained.

K-1 Keefer. Bottom

The Eden is more shaley and has nodules in it. The color is getting more buff on weathering. The lime beds in this horizon are diminished to a degree of almost complete disappearance. The Fairview is going back to lime again but it still does not have as much as the Trenton. The limes ~~are~~ have concretions in them and these make small folds in the shale & rocks ~~shave~~ when they get large enough. The shales are consolidated into layers that weather in a platform & ledge & roof appearance.

The empty spaces are weathered part.



The fossils get thinner as the horizons go up. The color changes from a dark blue in the Trenton to a light tan Eden or grey then to a deep tan and reddish in the Fairview. Some of the fossils are in definite layers while some or a good many ~~[illegible]~~ layers have none at all. Quite diff. from the Trenton and some of the Eden.

Very little calcite in Eden & less in the Fairview.

E = Juniata.

This is mostly a medium bedded sandstone. Has a tendency to run reddish & with green splotches. Some of the beds are a little darker and some are lighter. Mostly with a purplish tinge.

The first layers are greyish and these grade upward into a red & into a purplish; then back to a greenish green and then back to a reddish purple.

The stone is mostly coarse grained and rough. Has a few fossils and little or no calcite. It perhaps has a little chert. There is cross bedding and a little mica in the jointing planes of the upper layers.

It is a very resistant stone and is quite hard. It mostly has a sharp parting fracture. It is slickensided and has a little chlorite in the jointing planes which are well developed.

B-4 = Upper Mosheim.

B-5 = Lenoir. Upper most part.

This formation is nearly like the Shen. The rocks are all limes with ~~ext~~ calcite and chert. The beds are mostly thick and some massive. The top and the Lenoir begin to thin out until the top of the Lenoir is nearly like the Mocc. At the base is a chert breccia + at the top variegated limes. In the center are dark blue limes + at the top of the Murphysboro are limes that resemble the Shen. The breccia is the only way of really separating the two formations. Much chert + Calcite at the bottom and middle.

C = Moccasin.

(C-1 is the top and they work down to the bottom as the numbers go up.)
This varies from a very dense non crystaline, variegated fine lithographic limestone to a fracture jointed shaly lime.

The top is getting back to a dense lime again while in the middle it resembles the Trenton. Here are very thin beds of fracture jointed limes and a few thicker beds in between. There are fossils in this formation and mostly bryozoans. The beds do not convolute and seem competent. They grade from a dense - - - lime to a nodular fracture jointed and ~~thin~~ ~~[illegible]~~ bedded shaly lime back to a dark blue dense lime. On weathering they take on a dirty brown crumpled appearance and becomes a sort of a mud. Some of it has a shoe peg weathering.

D = Sevier.

This has three horizons but not enough diff. to be discussed under 3 headings. All are incompetent horizons + the same type of sed. The beds are alternate Shales and limes. The shales 'very limey'.
All of the thicker limes 'shales' and limes are very very fossiliferous. The beds are distinct and jointing in three directions making elongated and rhomb shaped blocks. The shales are shoe peg in weathering, not small amount weathers lighter. Some bedded very flint + aluminum.
The shales are convoluted into a thick layer but the bedding planes are shown clearly when the layer is hit.

Index to Specimens.

A = All Shen.

Heavy lime with shale partings and calcite + chert in good quantities. The calcite is predominant and is in some of the chert. Jointing fair as a whole + bedding planes are very good in middle + part of the upper. Fair in lower + extreme upper. Cleavage varies + weathers lighter than the rock itself. All hard. Some dust in layers + in nodules. Beds vary in thickness and the edges are pointed jagged.

B = Chickamauga.

B-1 = Chert breccia at bottom of Murfreesboro.

B-2 = Middle of Murfreesboro. Perhaps the top. Has calcite veins & stringers in the chert also.

B-3 = Bottom of Mosheim. This grades like lime the finer lines show. Very poor bedding in this layer.